DIPLOMADO DE PROFUNDIZACION CISCO
PRUEBA DE HABILIDADES PRÁCTICAS CCNP

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UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA - UNAD
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BOGOTA
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Diplomado de opción de grado presentado para optar el título de INGENIERO ELECTRÓNICO.

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NOTA DE ACEPTACION

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Firma del Jurado

BOGOTÁ, 15 de diciembre de 2022

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GLOSARIO.

Ipv4:
El Protocolo de Internet versión 4 (en inglés, Internet Protocol version 4, IPv4), es la cuarta versión del Internet Protocol (IP), un protocolo de interconexión de redes basados en Internet[1].

Ipv6:
IPv6 es una actualización al protocolo IPv4, diseñado para resolver el problema de agotamiento de direcciones. Su desarrollo comenzó en diciembre de 1998 cuando Steve Deering y Robert Hinden, empleados de Cisco y Nokia publicaron una especificación formal del protocolo a través de un RFC12 y aún continua su implementación[2].

MODELO OSI:
Este es un modelo que sirve como estándar de referencia que fija los modelos de las comunicaciones; inicialmente fue creado por la ISO y actualmente se mantiene ya que permite estandarizar la comunicación global de internet y también de área local por medio del establecimiento de protocolos de comunicación entre equipos de cómputo, en este sentido todos los paquetes enviados atraviesan las 7 capas de este modelo OSI[3].

Router:
Un rúter, enrutador, (del inglés router) o encaminador, es un dispositivo que permite interconectar computadoras que funcionan en el marco de una red. Su función: se encarga de establecer la ruta que destinará a cada paquete de datos dentro de una red informática[4].

Switch:
Conmutador (Switch) es el dispositivo digital lógico de interconexión de equipos que opera en la capa de enlace de datos del modelo OSI. Su función es interconectar dos o más host de manera similar a los puentes de red, pasando datos de un segmento a otro de acuerdo con la dirección MAC de destino de las tramas en la red y eliminando la conexión una vez finalizada esta[5].

VLAN:
Una VLAN, acrónimo de virtual LAN (red de área local virtual), es un método para crear redes lógicas independientes dentro de una misma red física. Varias VLAN pueden coexistir en un único conmutador físico o en una única red física[6].

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[1] ECHEGARAY YÉPEZ, Marco Antonio. Direccionamiento IPv4 e IPv6. (2021).
[2] SÁNCHEZ, Jose Roberto Patiño. Análisis del direccionamiento IPv6 y estudio de los Protocolos de Enrutamiento orientados a IPv6. *Maskana.* (2016)
[3] BARCELÓ José. Redes de computadores. (2004)
[4] MATURRO Gerardo; Guía para laboratorios de redes (2007)
[5]FROOM, R. Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide CCNP SWITCH 300-115. (2015).
[6] SINURAYA, Enda Wista. Teknik Variable Length Subnet Mask (Vlsm) Dan Virtual Local Area Network (Vlan). *(*2014).

RESUMEN

A lo largo del desarrollo de esta actividad se va a abordar un ESCENARIO que se entrega el cual consta de una serie de exigencias de aplicación definidas, las cuales se van a satisfacer con el fin de cumplir con las expectativas de la Organización. Toda el diseño y configuración de los diferentes dispositivos de la red se van a realizar con la ayuda del SIMULADOR GNS3 el cual como veremos es una excelente herramienta a la hora de poner en práctica todo lo aprendido a lo largo del diplomado de CISCO CCNP.

La red que se va a configurar en este caso cuenta con una serie de dispositivos intermedio como son ROUTERS, SWITCHES y dispositivos finales como PCs. Dispositivos que funcionan a nivel lógico tanto en capa 2 como en capa 3 con actividades bien definidas dentro de la red corporativa, que permitirán conectar REDES LAN tanto a nivel LOCAL como WAN que pueden estar en regiones geográficamente extensas.

Se entrega un diagrama de la TOPOLOGÍA que se va a configurar, se nos muestra los rangos de direcciones que se va a emplear para configurar cada una de las interfaces de los dispositivos que intervienen tanto para el direccionamiento IPV4 como direccionamiento IPV6. Se empleará según las circunstancias el direccionamiento estático como también DHCP, todo el proceso será documentado con el fin de que el mismo sirva de soporte en casos de mantenimiento de la red.

La configuración se realiza empleando la CLI de cada uno de los dispositivos, se configura los aspectos básicos, entre ellos nombres, contraseñas, interfaces, VLAN, ACL, enlaces Troncales, se configurará Protocolos de enrutamiento que serán los encargados del enrutamiento entre las diferentes redes.

Palabras Clave: CISCO, CCNP, Conmutación, Enrutamiento, Redes, Electrónica.

ABSTRACT

Throughout the development of this activity, a SCENARIO will be addressed that is delivered, which consists of a series of defined application requirements, which will be satisfied in order to meet the expectations of the Organization. All the design and configuration of the different network devices will be carried out with the help of the GNS3 SIMULATOR which, as we will see, is an excellent tool when it comes to putting into practice everything learned throughout the CISCO CCNP course.

The network that is going to be configured in this case has a series of intermediate devices such as ROUTERS, SWITCHES and end devices such as PCs. Devices that work at a logical level in both layer 2 and layer 3 with well-defined activities within the network. corporate, which will allow connecting LAN NETWORKS both at the LOCAL level and WAN that can be in geographically extensive regions.

A diagram of the TOPOLOGY that is going to be configured is delivered, it shows us the ranges of addresses that are going to be used to conFigura each of the interfaces of the devices that intervene both for IPV4 addressing and IPV6 addressing. Depending on the circumstances, static addressing as well as DHCP will be used, the entire process will be documented so that it serves as support in cases of network maintenance.

The configuration is carried out using the CLI of each of the devices, the basic aspects are configured, including names, passwords, interfaces, VLANs, ACLs, trunk links, routing protocols will be configured that will be responsible for routing between the different networks .

Keywords: CISCO, CCNP, Switching, Routing, Networks, Electronics.

INTRODUCCIÓN.

Desde los primeros días de nuestra existencia la comunicación ha sido un aspecto vital dentro de nuestras vidas y de nuestra supervivencia. Poco a poco las formas de la comunicación a evolucionado y adaptado a las circunstancias en las cuales se ha estado desarrollando, hasta llegar a nuestros días, donde como todos conocemos hace parte esencial de nuestro vivir.

Gracias a la evolución que también han tenido muchos otros campos a sido posible igualmente la evolución de dispositivos, que me han hecho posible conectarnos eliminando las barretas de la distancia. Inicialmente todos estos adelantos tuvieron origen militar, pero a medida que paso el tiempo han evolucionado hasta lo que conocemos ahora como las telecomunicaciones.

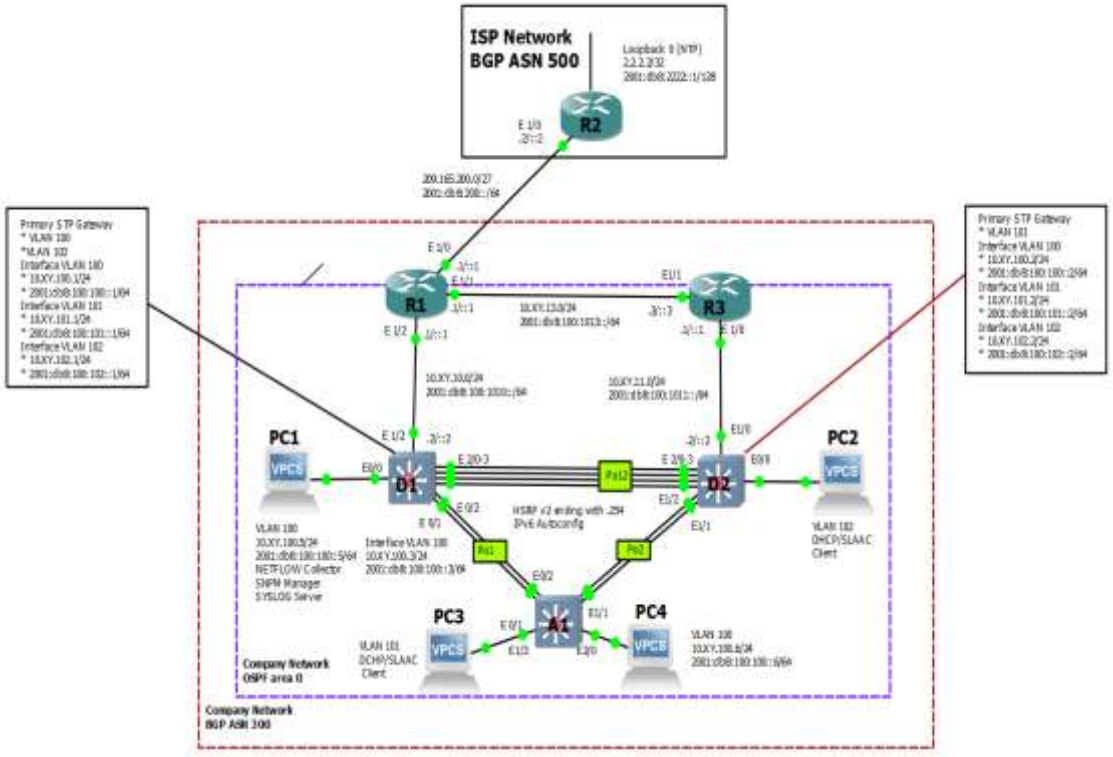
Son muchos los medios que disponemos ahora para transmitir información, entre los que podemos nombrar microondas, satelital, ondas electromagnéticas, o por fibras. Todas estas transmisiones siguen unos estándares con el fin de que se puedan comunicar independiente del medio que se esté empleando o los dispositivos que tenga que atravesar.

Como vemos, las organizaciones dependen directamente de las Telecomunicaciones, todos debemos tener la información a nuestra disposición cuando la necesitemos con el fin de tomas las decesiones correctas y en el menor tiempo posible, contando con la seguridad de datos reales y fehacientes.

ACTIVIDAD A DESARROLLAR.

Se procede con el desarrollo de la actividad indicada para lo cual se debe configurar los dispositivos de la FIGURA

Figura 1. Topología.



Fuente: CISCO.

TABLA DE DIRECCIONES.

Tabla 1. Tabla de direcciones.

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/0	209.165.200.225/27	2001:db8:200::1/64	fe80::1:1
R1	E1/2	10.32.10.1/24	2001:db8:100:1010::1/64	fe80::1:2

Device	Interface	IPv4 Address	IPv6 Address	IPv6 Link-Local
R1	E1/1	10.32.13.1/24	2001:db8:100:1013::1/64	fe80::1:3
R2	E1/0	209.165.200.226/27	2001:db8:200::2/64	fe80::2:1
R2	Loopback0	2.2.2.2/32	2001:db8:2222::1/128	fe80::2:3
R3	E1/0	10.32.11.1/24	2001:db8:100:1011::1/64	fe80::3:2
R3	E1/1	10.32.13.3/24	2001:db8:100:1013::3/64	fe80::3:3
D1	E1/2	10.32.10.2/24	2001:db8:100:1010::2/64	fe80::d1:1
D1	VLAN 100	10.32.100.1/24	2001:db8:100:100::1/64	fe80::d1:2
D1	VLAN 101	10.32.101.1/24	2001:db8:100:101::1/64	fe80::d1:3
D1	VLAN 102	10.32.102.1/24	2001:db8:100:102::1/64	fe80::d1:4
D2	E1/0	10.32.11.2/24	2001:db8:100:1011::2/64	fe80::d2:1
D2	VLAN 100	10.32.100.2/24	2001:db8:100:100::2/64	fe80::d2:2
D2	VLAN 101	10.32.101.2/24	2001:db8:100:101::2/64	fe80::d2:3
D2	VLAN 102	10.32.102.2/24	2001:db8:100:102::2/64	fe80::d2:4
A1	VLAN 100	10.32.100.3/23	2001:db8:100:100::3/64	fe80::a1:1
PC1	NIC	10.32.100.5/24	2001:db8:100:100::5/64	EUI-64
PC2	NIC	DHCP	SLAAC	EUI-64
PC3	NIC	DHCP	SLAAC	EUI-64
PC4	NIC	10.32.100.6/24	2001:db8:100:100::6/64	EUI-64

Fuente: CISCO - Autor.

Objectives

- Part 1: Build the Network and ConFigura Basic Device Settings and Interface Addressing
- Part 2: ConFigura the Layer 2 Network and Host Support
- Part 3: ConFigura Routing Protocols
- Part 4: ConFigura First-Hop Redundancy

Background / Scenario

In this skills assessment, you are responsible for completing the configuration of the network so there is full end-to-end reachability, so the hosts have reliable default gateway support, and so that management protocols are operational within the “Company Network” part of the topology. Be careful to verify that your

configurations meet the provided specifications and that the devices perform as required.

Note: The routers used with CCNP hands-on labs are Cisco 7200 routers. The switches used in the labs are Cisco Catalyst L2 switches Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs.
Note: Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.
Note: The letters "X, Y" represent the last two digits of your ID number (cédula).

1 . Build the Network and ConFigura Basic Device Settings and Interface Addressing

In Part 1, you will set up the network topology and conFigura basic settings and interface addressing.

Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

ConFigura basic settings for each device.

a. Console into each device, enter global configuration mode, and apply the basic settings. The startup configurations for each device are provided below.

Router R1

```
hostname R1
ipv6 unicast-routing
no ip domain lookup
banner motd # R1, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
interface e1/0
 ip address 209.165.200.225 255.255.255.224
 ipv6 address fe80::1:1 link-local
 ipv6 address 2001:db8:200::1/64
 no shutdown
 exit
interface e1/2
```

```
 ip address 10.32.10.1 255.255.255.0
 ipv6 address fe80::1:2 link-local
 ipv6 address 2001:db8:100:1010::1/64
 no shutdown
 exit
interface e1/1
 ip address 10.32.13.1 255.255.255.0
 ipv6 address fe80::1:3 link-local
 ipv6 address 2001:db8:100:1013::1/64
 no shutdown
 exit
```

Router R2

```
hostname R2
ipv6 unicast-routing
no ip domain lookup
banner motd # R2, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
interface e1/0
 ip address 209.165.200.226 255.255.255.224
 ipv6 address fe80::2:1 link-local
 ipv6 address 2001:db8:200::2/64
 no shutdown
 exit
interface Loopback 0
 ip address 2.2.2.2 255.255.255.255
 ipv6 address fe80::2:3 link-local
 ipv6 address 2001:db8:2222::1/128
 no shutdown
 exit
```

Router R3

```
hostname R3
ipv6 unicast-routing
no ip domain lookup
banner motd # R3, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
```

```
interface e1/0
 ip address 10.32.11.1 255.255.255.0
 ipv6 address fe80::3:2 link-local
 ipv6 address 2001:db8:100:1011::1/64
 no shutdown
 exit
interface e1/1
 ip address 10.32.13.3 255.255.255.0
 ipv6 address fe80::3:3 link-local
 ipv6 address 2001:db8:100:1010::2/64
 no shutdown
 exit
```

Switch D1

```
hostname D1
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D1, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
vlan 100
 name Management
 exit
vlan 101
 name UserGroupA
 exit
vlan 102
 name UserGroupB
 exit
vlan 999
 name NATIVE
 exit
interface e1/2
 no switchport
 ip address 10.32.10.2 255.255.255.0
 ipv6 address fe80::d1:1 link-local
 ipv6 address 2001:db8:100:1010::2/64
 no shutdown
 exit
interface vlan 100
 ip address 10.32.100.1 255.255.255.0
```

```
 ipv6 address fe80::d1:2 link-local
 ipv6 address 2001:db8:100:100::1/64
 no shutdown
 exit
interface vlan 101
 ip address 10.32.101.1 255.255.255.0
 ipv6 address fe80::d1:3 link-local
 ipv6 address 2001:db8:100:101::1/64
 no shutdown
 exit
interface vlan 102
 ip address 10.32.102.1 255.255.255.0
 ipv6 address fe80::d1:4 link-local
 ipv6 address 2001:db8:100:102::1/64
 no shutdown
 exit
ip dhcp excluded-address 10.32.101.1 10.32.101.109
ip dhcp excluded-address 10.32.101.141 10.32.101.254
ip dhcp excluded-address 10.32.102.1 10.32.102.109
ip dhcp excluded-address 10.32.102.141 10.32.102.254
ip dhcp pool VLAN-101
 network 10.32.101.0 255.255.255.0
 default-router 10.32.101.254
 exit
ip dhcp pool VLAN-102
 network 10.32.102.0 255.255.255.0
 default-router 10.32.102.254
 exit
interface range e0/0-3,e1/0-1,e1/3,e2/0-3,e3/0-3
 shutdown
 exit
```

Switch D2

```
hostname D2
ip routing
ipv6 unicast-routing
no ip domain lookup
banner motd # D2, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
vlan 100
 name Management
```

```
 exit
vlan 101
 name UserGroupA
 exit
vlan 102
 name UserGroupB
 exit
vlan 999
 name NATIVE
 exit
interface e1/0
 no switchport
 ip address 10.32.11.2 255.255.255.0
 ipv6 address fe80::d1:1 link-local
 ipv6 address 2001:db8:100:1011::2/64
 no shutdown
 exit
interface vlan 100
 ip address 10.32.100.2 255.255.255.0
 ipv6 address fe80::d2:2 link-local
 ipv6 address 2001:db8:100:100::2/64
 no shutdown
 exit
interface vlan 101
 ip address 10.32.101.2 255.255.255.0
 ipv6 address fe80::d2:3 link-local
 ipv6 address 2001:db8:100:101::2/64
 no shutdown
 exit
interface vlan 102
 ip address 10.32.102.2 255.255.255.0
 ipv6 address fe80::d2:4 link-local
 ipv6 address 2001:db8:100:102::2/64
 no shutdown
 exit
ip dhcp excluded-address 10.32.101.1 10.32.101.209
ip dhcp excluded-address 10.32.101.241 10.32.101.254
ip dhcp excluded-address 10.32.102.1 10.32.102.209
ip dhcp excluded-address 10.32.102.241 10.32.102.254
ip dhcp pool VLAN-101
 network 10.32.101.0 255.255.255.0
 default-router XY.0.101.254
 exit
ip dhcp pool VLAN-102
 network 10.32.102.0 255.255.255.0
```

```
 default-router 10.32.102.254
 exit
interface range e0/0-3,e1/1-3,e2/0-3,e3/0-3
 shutdown
 exit
```

Switch A1

```
hostname A1
no ip domain lookup
banner motd # A1, ENCOR Skills Assessment#
line con 0
 exec-timeout 0 0
 logging synchronous
 exit
vlan 100
 name Management
 exit
vlan 101
 name UserGroupA
 exit
vlan 102
 name UserGroupB
 exit
vlan 999
 name NATIVE
 exit
interface vlan 100
 ip address 10.32.100.3 255.255.255.0
 ipv6 address fe80::a1:1 link-local
 ipv6 address 2001:db8:100:100::3/64
 no shutdown
 exit
interface range e0/0,e0/3,e1/0,e2/1-3,e3/0-3
 shutdown
 exit
```

b. Save the running configuration to startup-config on all devices.
c. ConFigura PC 1 and PC 4 host addressing as shown in the addressing table. Assign a default gateway address of 10.32.100.254 which will be the HSRP virtual IP address used in Part 4.

2. ConFigura the Layer 2 Network and Host Support

In this part of the Skills Assessment, you will complete the Layer 2 network configuration and set up basic host support. At the end of this part, all the switches should be able to communicate. PC2 and PC3 should receive addressing from DHCP and SLAAC.

Your configuration tasks are as follows:

Tabla 2. Configuración de capa 2.

Task#	Task	Specification	Points
2.1	On all switches, conFigura IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: • D1 and D2 • D1 and A1 • D2 and A1	6
2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.	6
2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.	3
2.4	On D1 and D2, conFigura the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	ConFigura D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.	2
2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: • D1 to D2 – Port channel 12 • D1 to A1 – Port channel 1 • D2 to A1 – Port channel 2	3
2.6	On all switches, conFigura host access ports connecting to PC1, PC2, PC3, and PC4.	ConFigura access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.	4

Task#	Task	Specification	Points
2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.	1
2.8	Verify local LAN connectivity.	PC1 should successfully ping: • D1: 10.32.100.1 • D2: 10.32.100.2 • PC4: 10.32.100.6 PC2 should successfully ping: • D1: 10.32.102.1 • D2: 10.32.102.2 PC3 should successfully ping: • D1: 10.32.101.1 • D2: 10.32.101.2 PC4 should successfully ping: • D1: 10.32.100.1 • D2: 10.32.100.2 • PC1: 10.32.100.5	1

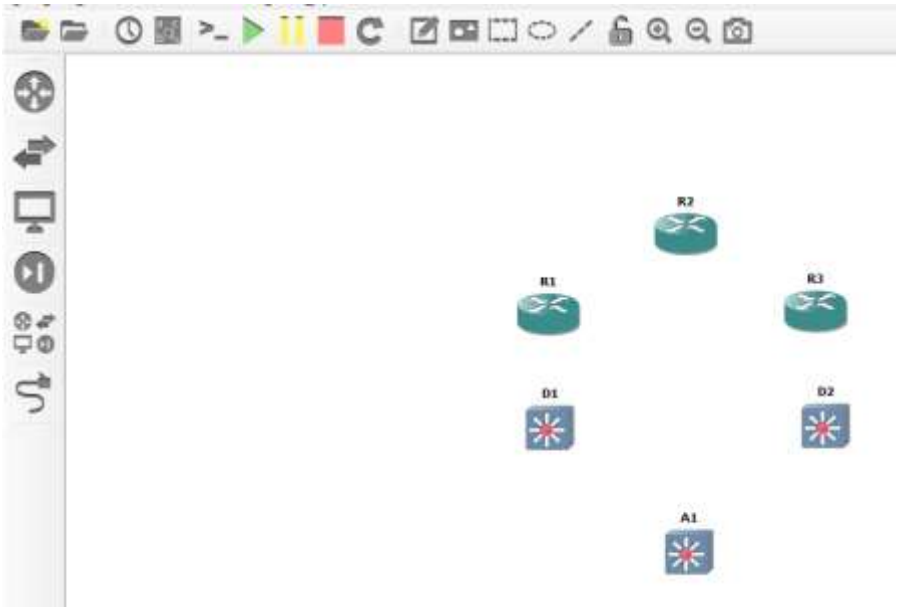
Fuente: CISCO.

1 . DESARROLLO DEL ESCENARIO PROPUESTO.

1.1 Construir la red y configurar los ajustes básicos del dispositivo y el direccionamiento de la interfaz

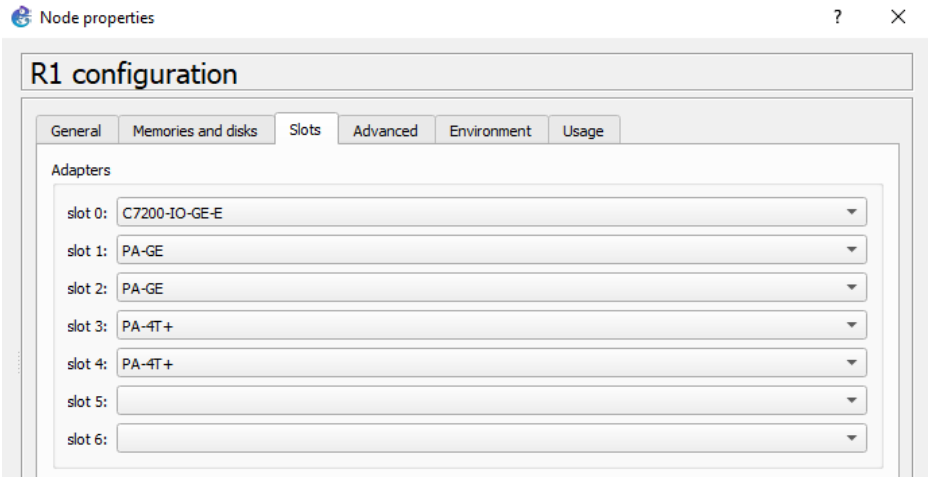
En la Parte 1, configurará la topología de la red y configurará los ajustes básicos y el direccionamiento de la interfaz.

Figura 2. Topología en GNS3.



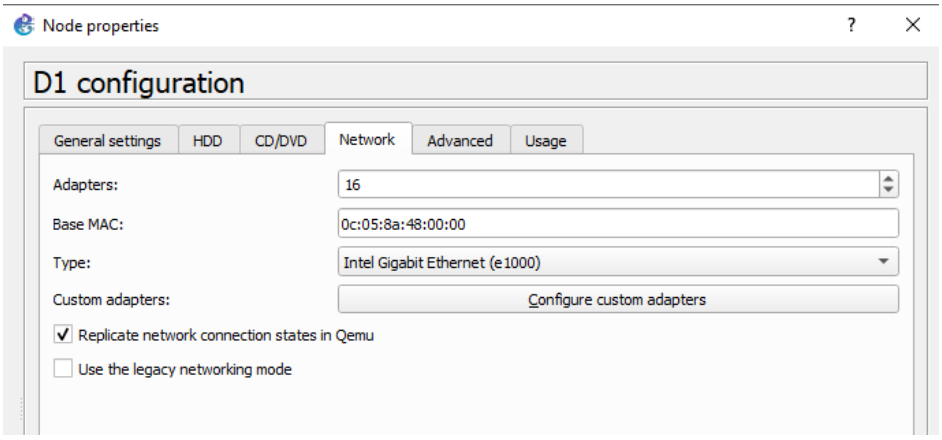
Fuente: Autoría Propia.

Figura 3. Módulos R1



Fuente: Autoría Propia – GNS3.

Figura 4. Configuración D1

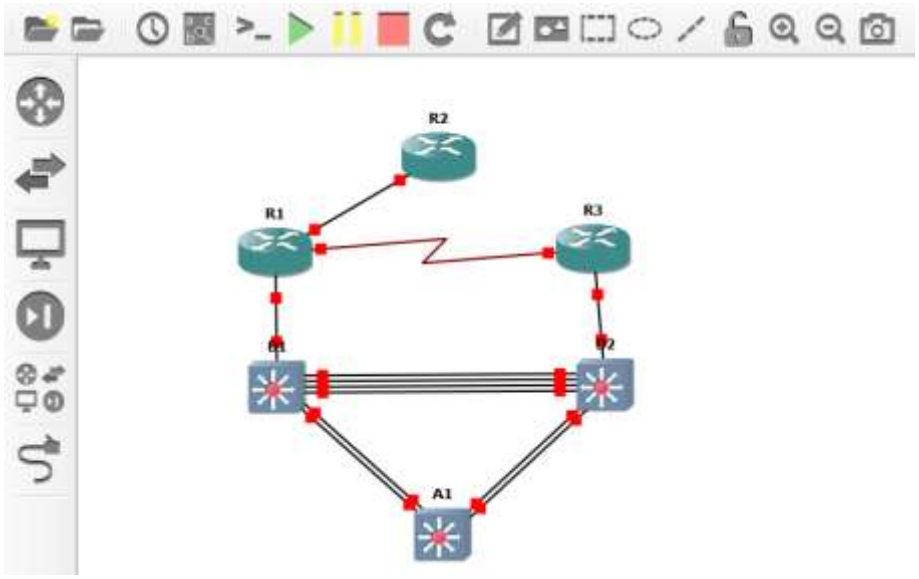


Fuente: Autoría Propia.

1.2 Cablee la red como se muestra en la topología.

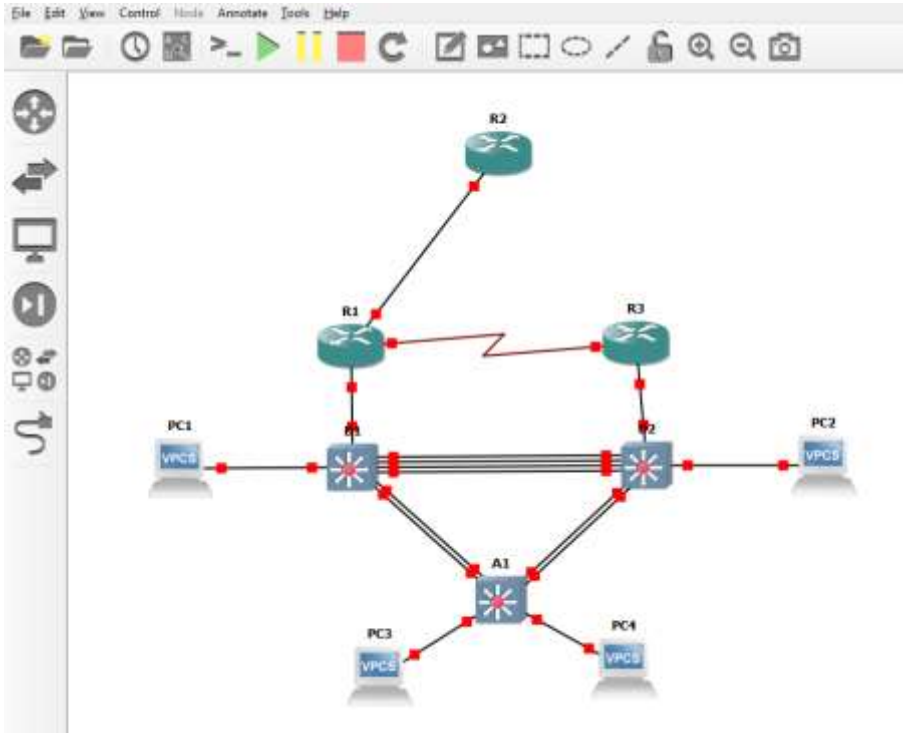
Conecte los dispositivos como se muestra en el diagrama de topología y cablee según sea necesario.

Figura 5. Cableado de Dispositivos según topología.



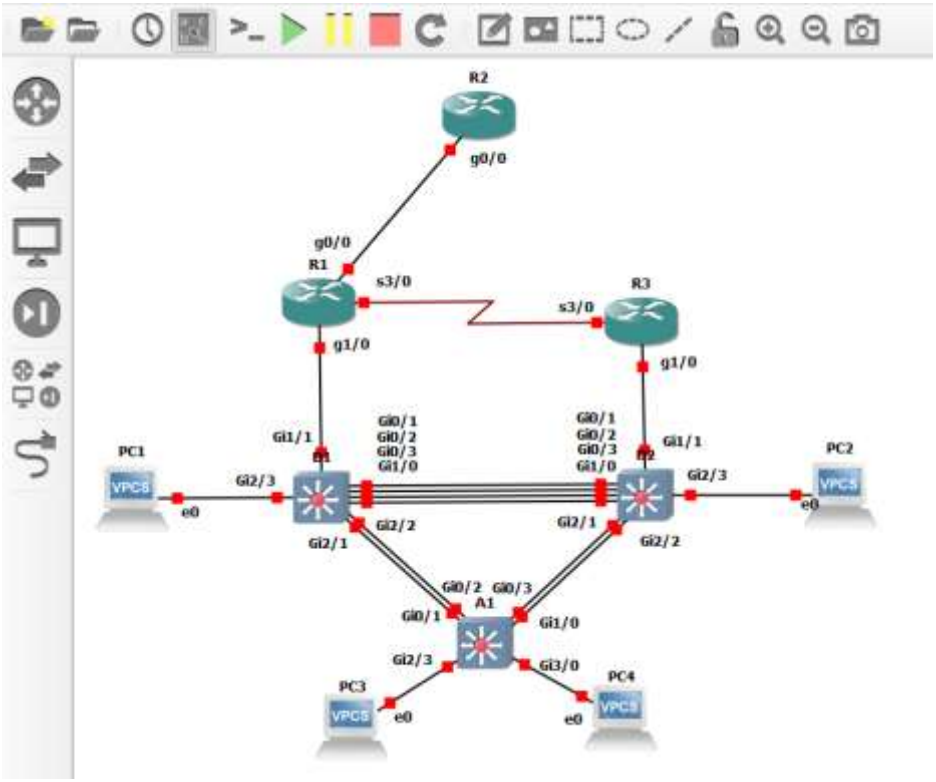
Fuente: Autoría Propia.

Figura 6. Agregado de PCs.



Fuente: Autoría Propia.

Figura 7. Etiquetas de interfaces.



Fuente: Autoría Propia.

1.3 Configura los ajustes básicos para cada dispositivo.

Consola en cada dispositivo, ingrese al modo de configuración global y aplique la configuración básica. Las configuraciones de inicio para cada dispositivo se proporcionan a continuación.

Router R1

Figura 8. Configuración básica R1.

```
R1#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#hostname R1
R1(config)#ipv6 unicast-routing
R1(config)#no ip domain lookup
R1(config)#banner motd # R1, ENCOR Skills Assessment#
R1(config)#line con 0
R1(config-line)# exec-timeout 0 0
R1(config-line)# logging synchronous
R1(config-line)# exit
R1(config)#interface g0/0
R1(config-if)# ip address 209.165.200.225 255.255.255.224
R1(config-if)# ipv6 address fe80::1:1 link-local
R1(config-if)# ipv6 address 2001:db8:200::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#interface g1/0
R1(config-if)# ip address 10.32.10.1 255.255.255.0
R1(config-if)# ipv6 address fe80::1:2 link-local
R1(config-if)# ipv6 address 2001:db8:100:1010::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#interface s3/0
R1(config-if)# ip address 10.32.13.1 255.255.255.0
R1(config-if)# ipv6 address fe80::1:3 link-local
R1(config-if)# ipv6 address 2001:db8:100:1013::1/64
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#
```

Fuente: Autoría Propia.

Router R2

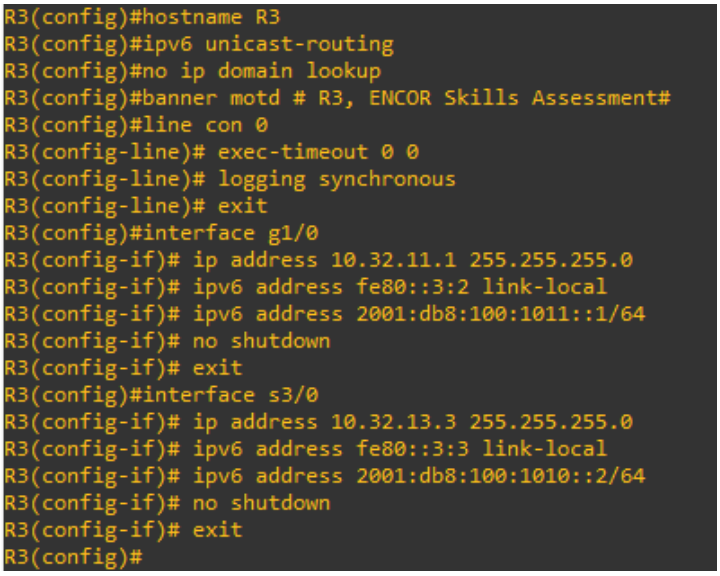
Figura 9. Configuración básica R2.

```
R2(config)#hostname R2
R2(config)#ipv6 unicast-routing
R2(config)#no ip domain lookup
R2(config)#banner motd # R2, ENCOR Skills Assessment#
R2(config)#line con 0
R2(config-line)# exec-timeout 0 0
R2(config-line)# logging synchronous
R2(config-line)# exit
R2(config)#interface g0/0
R2(config-if)# ip address 209.165.200.226 255.255.255.224
R2(config-if)# ipv6 address fe80::2:1 link-local
R2(config-if)# ipv6 address 2001:db8:200::2/64
R2(config-if)# no shutdown
R2(config-if)# exit
R2(config)#interface Loopback 0
R2(config-if)# ip address 2.2.2.2 255.255.255.255
R2(config-if)# ipv6 address fe80::2:3 link-local
R2(config-if)# ipv6 address 2001:db8:2222::1/128
R2(config-if)# no shutdown
R2(config-if)# exit
R2(config)#
```

Fuente: Autoría Propia.

Router R3

Figura 10. Configuración básica R3.

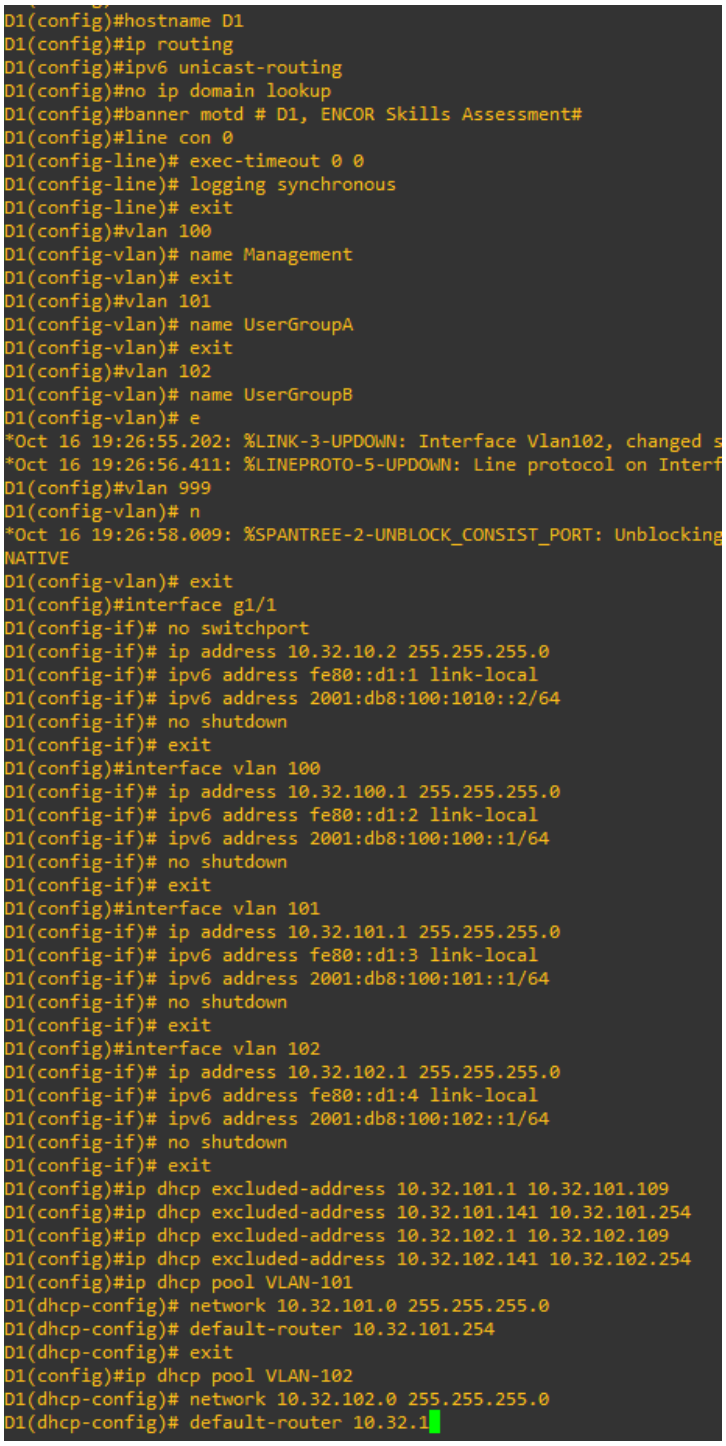


```
R3(config)#hostname R3
R3(config)#ipv6 unicast-routing
R3(config)#no ip domain lookup
R3(config)#banner motd # R3, ENCOR Skills Assessment#
R3(config)#line con 0
R3(config-line)# exec-timeout 0 0
R3(config-line)# logging synchronous
R3(config-line)# exit
R3(config)#interface g1/0
R3(config-if)# ip address 10.32.11.1 255.255.255.0
R3(config-if)# ipv6 address fe80::3:2 link-local
R3(config-if)# ipv6 address 2001:db8:100:1011::1/64
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)#interface s3/0
R3(config-if)# ip address 10.32.13.3 255.255.255.0
R3(config-if)# ipv6 address fe80::3:3 link-local
R3(config-if)# ipv6 address 2001:db8:100:1010::2/64
R3(config-if)# no shutdown
R3(config-if)# exit
R3(config)#
```

Fuente: Autoría Propia.

Switch D1

Figura 11. Configuración básica D1.



```
D1(config)#hostname D1
D1(config)#ip routing
D1(config)#ipv6 unicast-routing
D1(config)#no ip domain lookup
D1(config)#banner motd # D1, ENCOR Skills Assessment#
D1(config)#line con 0
D1(config-line)# exec-timeout 0 0
D1(config-line)# logging synchronous
D1(config-line)# exit
D1(config)#vlan 100
D1(config-vlan)# name Management
D1(config-vlan)# exit
D1(config)#vlan 101
D1(config-vlan)# name UserGroupA
D1(config-vlan)# exit
D1(config)#vlan 102
D1(config-vlan)# name UserGroupB
D1(config-vlan)# e
*Oct 16 19:26:55.202: %LINK-3-UPDOWN: Interface Vlan102, changed s
*Oct 16 19:26:56.411: %LINEPROTO-5-UPDOWN: Line protocol on Interf
D1(config)#vlan 999
D1(config-vlan)# n
*Oct 16 19:26:58.009: %SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking
NATIVE
D1(config-vlan)# exit
D1(config)#interface g1/1
D1(config-if)# no switchport
D1(config-if)# ip address 10.32.10.2 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:1 link-local
D1(config-if)# ipv6 address 2001:db8:100:1010::2/64
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#interface vlan 100
D1(config-if)# ip address 10.32.100.1 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:2 link-local
D1(config-if)# ipv6 address 2001:db8:100:100::1/64
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#interface vlan 101
D1(config-if)# ip address 10.32.101.1 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:3 link-local
D1(config-if)# ipv6 address 2001:db8:100:101::1/64
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#interface vlan 102
D1(config-if)# ip address 10.32.102.1 255.255.255.0
D1(config-if)# ipv6 address fe80::d1:4 link-local
D1(config-if)# ipv6 address 2001:db8:100:102::1/64
D1(config-if)# no shutdown
D1(config-if)# exit
D1(config)#ip dhcp excluded-address 10.32.101.1 10.32.101.109
D1(config)#ip dhcp excluded-address 10.32.101.141 10.32.101.254
D1(config)#ip dhcp excluded-address 10.32.102.1 10.32.102.109
D1(config)#ip dhcp excluded-address 10.32.102.141 10.32.102.254
D1(config)#ip dhcp pool VLAN-101
D1(dhcp-config)# network 10.32.101.0 255.255.255.0
D1(dhcp-config)# default-router 10.32.101.254
D1(dhcp-config)# exit
D1(config)#ip dhcp pool VLAN-102
D1(dhcp-config)# network 10.32.102.0 255.255.255.0
D1(dhcp-config)# default-router 10.32.1
```

```
D1(config-if)#interface range g0/1-3, g1/0
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#channel-group 12 mode active
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#interface range g2/1-2
D1(config-if-range)#switchport trunk encapsulation dot1q
D1(config-if-range)#switchport mode trunk
D1(config-if-range)#switchport trunk native vlan 999
D1(config-if-range)#channel-group 1 mode active
D1(config-if-range)#no shutdown
D1(config-if-range)#exit
D1(config)#spanning-tree mode rapid-pvst
D1(config)#spanning-tree vlan 100,102 root primary
D1(config)#spanning-tree vlan 101 root secondary
D1(config)#interface g2/3
D1(config-if)#switchport mode access
D1(config-if)#switchport access vlan 100
D1(config-if)#spanning-tree portfast
D1(config-if)#no shutdown
D1(config-if)#exit
D1(config)#
```

Fuente: Autoría Propia.

Switch D2

Figura 12. Configuración básica D2.

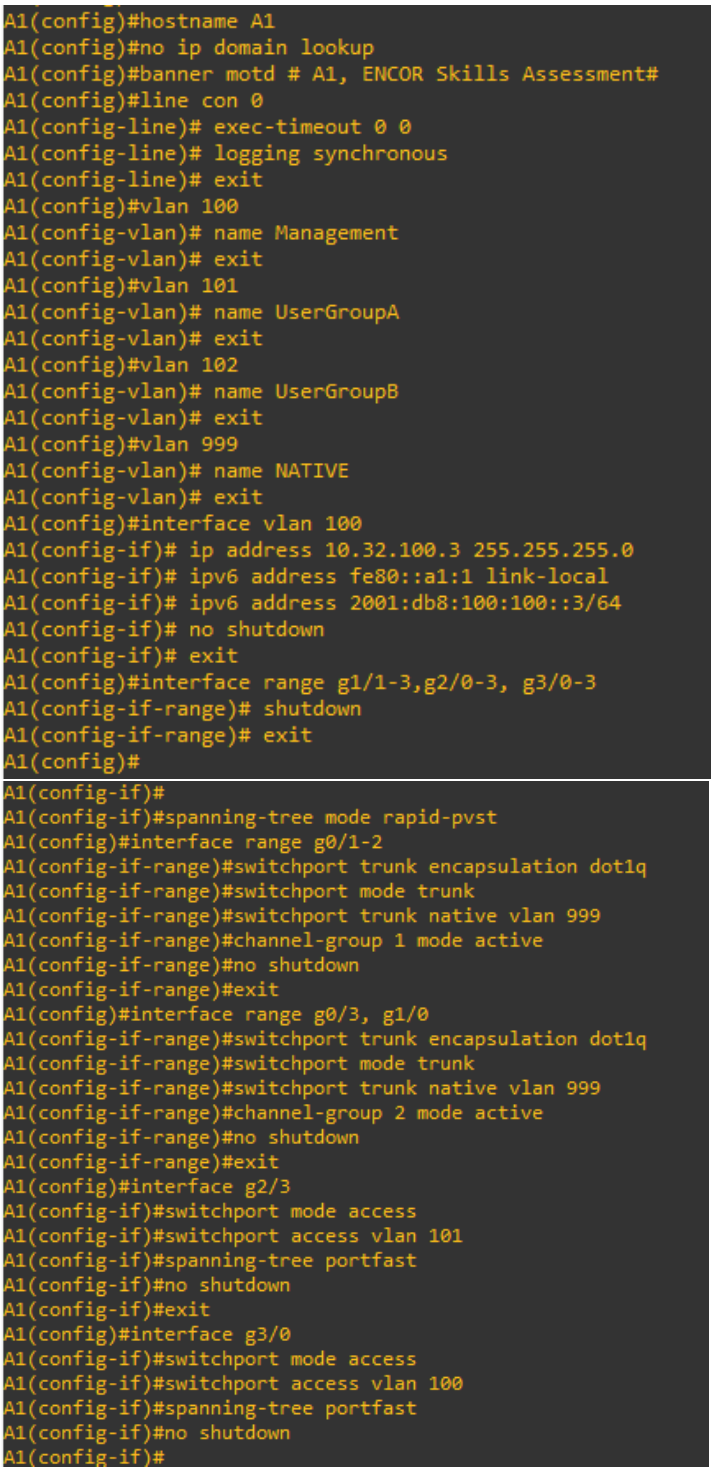
```
D2(config)#hostname D2
D2(config)#ip routing
D2(config)#ipv6 unicast-routing
D2(config)#no ip domain lookup
D2(config)#banner motd # D2, ENCOR Skills Assessment#
D2(config)#line con 0
D2(config-line)# exec-timeout 0 0
D2(config-line)# logging synchronous
D2(config-line)# exit
D2(config)#vlan 100
D2(config-vlan)# name Management
D2(config-vlan)# exit
D2(config)#vlan 101
D2(config-vlan)# name UserGroupA
D2(config-vlan)# exit
D2(config)#vlan 102
D2(config-vlan)# name UserGroupB
D2(config-vlan)# exit
D2(config)#vlan 999
D2(config-vlan)# name NATIVE
D2(config-vlan)# exit
D2(config)#interface g1/1
D2(config-if)# no switchport
D2(config-if)# ip address 10.32.11.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d1:1 link-local
D2(config-if)# ipv6 address 2001:db8:100:1011::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface vlan 100
D2(config-if)# ip address 10.32.100.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:2 link-local
D2(config-if)# ipv6 address 2001:db8:100:100::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface vlan 101
D2(config-if)# ip address 10.32.101.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:3 link-local
D2(config-if)# ipv6 address 2001:db8:100:101::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#interface vlan 102
D2(config-if)# ip address 10.32.102.2 255.255.255.0
D2(config-if)# ipv6 address fe80::d2:4 link-local
D2(config-if)# ipv6 address 2001:db8:100:102::2/64
D2(config-if)# no shutdown
D2(config-if)# exit
D2(config)#ip dhcp excluded-address 10.32.101.1 10.32.101.209
D2(config)#ip dhcp excluded-address 10.32.101.241 10.32.101.254
D2(config)#ip dhcp excluded-address 10.32.102.1 10.32.102.209
D2(config)#ip dhcp excluded-address 10.32.102.241 10.32.102.254
D2(config)#ip dhcp pool VLAN-101
D2(dhcp-config)# network 10.32.101.0 255.255.255.0
D2(dhcp-config)# default-router 10.32.101.254
D2(dhcp-config)# exit
D2(config)#ip dhcp pool VLAN-102
D2(dhcp-config)# network 10.32.102.0 255.255.255.0
D2(dhcp-config)# default-router 10.32.102.254
D2(dhcp-config)# exit
D2(config)#interface range g0/0-3,g1/0,g1/2-3,g2/0-3,g3/0-3
D2(config-if-range)# shutdown
D2(config-if-range)# exit
D2(config)#
```

```
D2(config-if)#interface range g0/1-3, g1/0
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#channel-group 12 mode active
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#interface range g2/1-2
D2(config-if-range)#switchport trunk encapsulation dot1q
D2(config-if-range)#switchport mode trunk
D2(config-if-range)#switchport trunk native vlan 999
D2(config-if-range)#channel-group 2 mode active
D2(config-if-range)#no shutdown
D2(config-if-range)#exit
D2(config)#spanning-tree mode rapid-pvst
D2(config)#spanning-tree vlan 101 root primary
D2(config)#spanning-tree vlan 100,102 root secondary
D2(config)#interface g2/3
D2(config-if)#switchport mode access
D2(config-if)#switchport access vlan 102
D2(config-if)#spanning-tree portfast
D2(config-if)#no shutdown
D2(config-if)#
```

Fuente: Autoría Propia.

Switch A1

Figura 13. Configuración básica A1.



```
A1(config)#hostname A1
A1(config)#no ip domain lookup
A1(config)#banner motd # A1, ENCOR Skills Assessment#
A1(config)#line con 0
A1(config-line)# exec-timeout 0 0
A1(config-line)# logging synchronous
A1(config-line)# exit
A1(config)#vlan 100
A1(config-vlan)# name Management
A1(config-vlan)# exit
A1(config)#vlan 101
A1(config-vlan)# name UserGroupA
A1(config-vlan)# exit
A1(config)#vlan 102
A1(config-vlan)# name UserGroupB
A1(config-vlan)# exit
A1(config)#vlan 999
A1(config-vlan)# name NATIVE
A1(config-vlan)# exit
A1(config)#interface vlan 100
A1(config-if)# ip address 10.32.100.3 255.255.255.0
A1(config-if)# ipv6 address fe80::a1:1 link-local
A1(config-if)# ipv6 address 2001:db8:100:100::3/64
A1(config-if)# no shutdown
A1(config-if)# exit
A1(config)#interface range g1/1-3,g2/0-3, g3/0-3
A1(config-if-range)# shutdown
A1(config-if-range)# exit
A1(config)#
A1(config-if)#
A1(config-if)#spanning-tree mode rapid-pvst
A1(config)#interface range g0/1-2
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 1 mode active
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface range g0/3, g1/0
A1(config-if-range)#switchport trunk encapsulation dot1q
A1(config-if-range)#switchport mode trunk
A1(config-if-range)#switchport trunk native vlan 999
A1(config-if-range)#channel-group 2 mode active
A1(config-if-range)#no shutdown
A1(config-if-range)#exit
A1(config)#interface g2/3
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 101
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#exit
A1(config)#interface g3/0
A1(config-if)#switchport mode access
A1(config-if)#switchport access vlan 100
A1(config-if)#spanning-tree portfast
A1(config-if)#no shutdown
A1(config-if)#
```

Fuente: Autoría Propia.

2. Configurar la red de capa 2 y la compatibilidad con el host

En esta parte de la evaluación de habilidades, completará la configuración de la red de capa 2 y configurará el soporte de host básico. Al final de esta parte, todos los interruptores deberían poder comunicarse. PC2 y PC3 deben recibir direccionamiento de DHCP y SLAAC.

Sus tareas de configuración son las siguientes:

2.1 configuración de IEEE 802.1Q

Tabla 3. configuración IEEE 802.1Q

Task#	Task	Specification
2.1	On all switches, conFigura IEEE 802.1Q trunk interfaces on interconnecting switch links	Enable 802.1Q trunk links between: • D1 and D2 • D1 and A1 • D2 and A1

Fuente: CISCO - Autor.

D1

```
interface range g0/1-3, g1/0
switchport trunk encapsulation dot1q
switchport mode trunk

interface range g2/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
```

D2

```
interface range g0/1-3, g1/0
switchport trunk encapsulation dot1q
switchport mode trunk

interface range g2/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
```

A1

```
interface range g0/1-2
switchport trunk encapsulation dot1q
switchport mode trunk

interface range g0/3, g1/0
switchport trunk encapsulation dot1q
switchport mode trunk
```

2.2 cambio de la VLAN nativas en los enlaces TRONCALES.

Tabla 4. Configuración VLAN y enlaces Troncales.

2.2	On all switches, change the native VLAN on trunk links.	Use VLAN 999 as the native VLAN.

Fuente: CISCO - Autor.

D1

```
interface range g0/1-3, g1/0
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999

interface range g2/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
```

D2

```
interface range g0/1-3, g1/0
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999

interface range g2/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999
```

A1

interface range g0/1-2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999

interface range g0/3, g1/0
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 999

2.3 habilitar el protocol Rapid Spanning-Tree

Tabla 5. habilitar protocolo Rapid-Spanning.

2.3	On all switches, enable the Rapid Spanning-Tree Protocol.	Use Rapid Spanning Tree.

Fuente: CISCO - Autor.

Rapid Spanning Tree Protocol (RSTP) es un protocolo de red de la segunda capa OSI, (nivel de enlace de datos), que gestiona enlaces redundantes. Especificado en IEEE 802.1w, es una evolución del Spanning tree Protocol (STP), reemplazándolo en la edición 2004 del 802.1d. RSTP reduce significativamente el tiempo de convergencia de la topología de la red cuando ocurre un cambio en la topología.

D1

spanning-tree mode rapid-pvst

D2

spanning-tree mode rapid-pvst

A1

spanning-tree mode rapid-pvst

2.4 En D1 y D2, ConFigura RSTP root bridges basado en la información de

la Topología.

Tabla 6. Configuración RSTP root bridges.

2.4	On D1 and D2, conFigura the appropriate RSTP root bridges based on the information in the topology diagram. D1 and D2 must provide backup in case of root bridge failure.	ConFigura D1 and D2 as root for the appropriate VLANs with mutually supporting priorities in case of switch failure.

Fuente: CISCO - Autor.

D1

spanning-tree vlan 100,102 root primary
spanning-tree vlan 101 root secondary

D2

spanning-tree vlan 101 root primary }
spanning-tree vlan 100,102 root secondary

2.5 Configuración de EtherChannels

Tabla 7. Creación de LACP EtherChannels.

2.5	On all switches, create LACP EtherChannels as shown in the topology diagram.	Use the following channel numbers: • D1 to D2 – Port channel 12 • D1 to A1 – Port channel 1 • D2 to A1 – Port channel 2

Fuente: CISCO - Autor.

D1

interface range g0/1-3, g1/0
channel-group 12 mode active
no shutdown

interface range g2/1-2

channel-group 1 mode active
no shutdown

D2

interface range g0/1-3, g1/0
channel-group 12 mode active
no shutdown

interface range g2/1-2
channel-group 2 mode active
no shutdown

A1

interface range g0/1-2
channel-group 1 mode active
no shutdown

interface range g0/3, g1/0
channel-group 2 mode active
no shutdown

2.6 Configuración de los puertos de Acceso.

Tabla 8. Configuración de puertos de acceso.

2.6	On all switches, conFigura host access ports connecting to PC1, PC2, PC3, and PC4.	ConFigura access ports with appropriate VLAN settings as shown in the topology diagram. Host ports should transition immediately to forwarding state.

Fuente: CISCO - Autor.

D1

```
interface g2/3
switchport mode access
switchport access vlan 100
spanning-tree portfast
no shutdown
```

D2

```
interface g2/3
switchport mode access
switchport access vlan 102
spanning-tree portfast
no shutdown
```

A1

```
interface g2/3
switchport mode access
switchport access vlan 101
spanning-tree portfast
no shutdown

interface g3/0
switchport mode access
switchport access vlan 100
spanning-tree portfast
no shutdown
```

2.7 Verificación de configuración.

Tabla 9. Configuración de puertos de acceso.

2.7	Verify IPv4 DHCP services.	PC2 and PC3 are DHCP clients and should be receiving valid IPv4 addresses.

Fuente: CISCO - Autor.

Se deben activar los PC.

Tabla 10.Configuración de puertos de acceso.

2.8	Verify local LAN connectivity.	PC1 should successfully ping: • D1: 10.32.100.1 • D2: 10.32.100.2 • PC4: 10.32.100.6 PC2 should successfully ping: • D1: 10.32.102.1 • D2: 10.32.102.2 PC3 should successfully ping: • D1: 10.32.101.1 • D2: 10.32.101.2 PC4 should successfully ping: • D1: 10.32.100.1 • D2: 10.32.100.2 • PC1: 10.32.100.5

Fuente: CISCO - Autor.

2.7.1 SHOW INTERFACE TRUNK

Figura 14. show interface trunk D1

```
D1#SHOW INTERFACE TRUNK

Port        Mode             Encapsulation  Status        Native vlan
Po12        on               802.1q         trunking      999
Po1         on               802.1q         trunking      999

Port        Vlans allowed on trunk
Po12        1-4094
Po1         1-4094

Port        Vlans allowed and active in management domain
Po12        1,100-102,999
Po1         1,100-102,999

Port        Vlans in spanning tree forwarding state and not pruned
Po12        1,100-102,999
Po1         1,100-102,999
D1#
```

Fuente: Autoría Propia.

Figura 15. show interface trunk D2

```
D2#show interface trunk

Port        Mode             Encapsulation  Status        Native vlan
Po12        on               802.1q         trunking      999
Po2         on               802.1q         trunking      999

Port        Vlans allowed on trunk
Po12        1-4094
Po2         1-4094

Port        Vlans allowed and active in management domain
Po12        1,100-102,999
Po2         1,100-102,999

Port        Vlans in spanning tree forwarding state and not pruned
Po12        1,100-102,999
Po2         1,100-102,999
D2#
```

Fuente: Autoría Propia.

Figura 16. show interface trunk D1

```
A1#show interface trunk

Port        Mode             Encapsulation  Status        Native vlan
Po1         on               802.1q         trunking      999
Po2         on               802.1q         trunking      999

Port        Vlans allowed on trunk
Po1         1-4094
Po2         1-4094

Port        Vlans allowed and active in management domain
Po1         1,100-102,999
Po2         1,100-102,999

Port        Vlans in spanning tree forwarding state and not pruned
Po1         1,100,102,999
Po2         101
A1#
```

Fuente: Autoría Propia.

2.7.2 SHOW IP INTERFACE BRIEF

Figura 17. show ip interface brief D1

```
D1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  up                    up
GigabitEthernet0/2     unassigned      YES unset  up                    up
GigabitEthernet0/3     unassigned      YES unset  up                    up
GigabitEthernet1/0     unassigned      YES unset  up                    up
GigabitEthernet1/2     unassigned      YES unset  administratively down down
GigabitEthernet1/3     unassigned      YES unset  administratively down down
GigabitEthernet1/1     10.32.10.2      YES manual down                  down
GigabitEthernet2/0     unassigned      YES unset  administratively down down
GigabitEthernet2/1     unassigned      YES unset  up                    up
GigabitEthernet2/2     unassigned      YES unset  up                    up
GigabitEthernet2/3     unassigned      YES unset  up                    up
GigabitEthernet3/0     unassigned      YES unset  administratively down down
GigabitEthernet3/1     unassigned      YES unset  administratively down down
GigabitEthernet3/2     unassigned      YES unset  administratively down down
GigabitEthernet3/3     unassigned      YES unset  administratively down down
Port-channel12         unassigned      YES unset  up                    up
Port-channel1          unassigned      YES unset  up                    up
Vlan100                10.32.100.1     YES manual up                    up
Vlan101                10.32.101.1     YES manual up                    up
Vlan102                10.32.102.1     YES manual up                    up
D1#
```

Fuente: Autoría Propia.

Figura 18. show ip interface brief D2

```
D2#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  administratively down down
GigabitEthernet0/1     unassigned      YES unset  up                    up
GigabitEthernet0/2     unassigned      YES unset  up                    up
GigabitEthernet0/3     unassigned      YES unset  up                    up
GigabitEthernet1/0     unassigned      YES unset  up                    up
GigabitEthernet1/2     unassigned      YES unset  administratively down down
GigabitEthernet1/3     unassigned      YES unset  administratively down down
GigabitEthernet1/1     10.32.11.2      YES manual down                  down
GigabitEthernet2/0     unassigned      YES unset  administratively down down
GigabitEthernet2/1     unassigned      YES unset  up                    up
GigabitEthernet2/2     unassigned      YES unset  up                    up
GigabitEthernet2/3     unassigned      YES unset  up                    up
GigabitEthernet3/0     unassigned      YES unset  administratively down down
GigabitEthernet3/1     unassigned      YES unset  administratively down down
GigabitEthernet3/2     unassigned      YES unset  administratively down down
GigabitEthernet3/3     unassigned      YES unset  administratively down down
Port-channel12         unassigned      YES unset  up                    up
Port-channel2          unassigned      YES unset  up                    up
Vlan100                10.32.100.2     YES manual up                    up
Vlan101                10.32.101.2     YES manual up                    up
Vlan102                10.32.102.2     YES manual up                    up
D2#
```

Fuente: Autoría Propia.

Figura 19. show ip interface brief A1

```
A1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  down                  down
GigabitEthernet0/1     unassigned      YES unset  up                    up
GigabitEthernet0/2     unassigned      YES unset  up                    up
GigabitEthernet0/3     unassigned      YES unset  up                    up
GigabitEthernet1/0     unassigned      YES unset  up                    up
GigabitEthernet1/1     unassigned      YES unset  administratively down down
GigabitEthernet1/2     unassigned      YES unset  administratively down down
GigabitEthernet1/3     unassigned      YES unset  administratively down down
GigabitEthernet2/0     unassigned      YES unset  administratively down down
GigabitEthernet2/1     unassigned      YES unset  administratively down down
GigabitEthernet2/2     unassigned      YES unset  administratively down down
GigabitEthernet2/3     unassigned      YES unset  up                    up
GigabitEthernet3/0     unassigned      YES unset  up                    up
GigabitEthernet3/1     unassigned      YES unset  administratively down down
GigabitEthernet3/2     unassigned      YES unset  administratively down down
GigabitEthernet3/3     unassigned      YES unset  administratively down down
Port-channel1          unassigned      YES unset  up                    up
Port-channel2          unassigned      YES unset  up                    up
Vlan100                10.32.100.3     YES manual up                    up
A1#
```

Fuente: Autoría Propia.

3. ConFigura Routing Protocols

In this part, you will conFigura IPv4 and IPv6 routing protocols. At the end of this part, the network should be fully converged. IPv4 and IPv6 pings to the Loopback 0 interface from D1 and D2 should be successful.

Note: Pings from the hosts will not be successful because their default gateways are pointing to the HSRP address which will be enabled in Part 4.

Your configuration tasks are as follows:

3.1 Configuración de ID y AREA OSPF.

Tabla 11. Configuración OSPF.

Task#	Task	Specification	Points
3.1	On the “Company Network” (i.e., R1, R3, D1, and D2), conFigura single-area OSPFv2 in area 0.	Use OSPF Process ID **4** and assign the following router-IDs: • R1: 0.0.4.1 • R3: 0.0.4.3 • D1: 0.0.4.131 • D2: 0.0.4.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv2 advertisements on:	8

Task#	Task	Specification	Points
		• D1: All interfaces except E1/2 • D2: All interfaces except E1/0	

Fuente: CISCO - Autor.

R1

```
router ospf 4
router-id 0.0.4.1
network 10.32.10.0 0.0.0.255 area 0
network 10.32.13.0 0.0.0.255 area 0
default-information originate
```

R3

```
router ospf 4
router-id 0.0.4.3
network 10.32.11.0 0.0.0.255 area 0
network 10.32.13.0 0.0.0.255 area 0
```

D1

```
router ospf 4
router-id 0.0.4.131
network 10.32.100.0 0.0.0.255 area 0
network 10.32.101.0 0.0.0.255 area 0
network 10.32.102.0 0.0.0.255 area 0
network 10.32.10.0 0.0.0.255 area 0

passive-interface default
no passive-interface g1/1
```

D2

```
router ospf 4
router-id 0.0.4.132
network 10.32.100.0 0.0.0.255 area 0
network 10.32.101.0 0.0.0.255 area 0
network 10.32.102.0 0.0.0.255 area 0
network 10.32.11.0 0.0.0.255 area 0
passive-interface default
no passive-interface g1/1
```

3.2 configuración de OSPF v3.

Tabla 12. Configuración OPSF V3.

3.2	On the “Company Network” (i.e., R1, R3, D1, and D2), conFigura classic single-area OSPFv3 in area 0.	Use OSPF Process ID **6** and assign the following router-IDs: • R1: 0.0.6.1 • R3: 0.0.6.3 • D1: 0.0.6.131 • D2: 0.0.6.132 On R1, R3, D1, and D2, advertise all directly connected networks / VLANs in Area 0. • On R1, do not advertise the R1 – R2 network. • On R1, propagate a default route. Note that the default route will be provided by BGP. Disable OSPFv3 advertisements on: • D1: All interfaces except E1/2 • D2: All interfaces except E1/0	8

Fuente: CISCO - Autor.

R1

```
ipv6 router ospf 6
router-id 0.0.6.1
default-information originate
interface g1/0
ipv6 ospf 6 area 0
exit
interface s3/0
ipv6 ospf 6 area 0
exit
```

R3

```
ipv6 router ospf 6
router-id 0.0.6.3
interface g1/0
ipv6 ospf 6 area 0
exit
interface s3/0
ipv6 ospf 6 area 0
```

D1

```
ipv6 router ospf 6
router-id 0.0.6.131
interface g1/1
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
passive-interface default
no passive-interface g1/1
exit
```

D2

```
ipv6 router ospf 6
router-id 0.0.6.132
interface g1/1
ipv6 ospf 6 area 0
exit
interface vlan 100
ipv6 ospf 6 area 0
exit
interface vlan 101
ipv6 ospf 6 area 0
exit
interface vlan 102
ipv6 ospf 6 area 0
exit
passive-interface default
no passive-interface g1/1
exit
```

3.3 configuración de MP-BGP en R2.

Tabla 13. Configuración MP-BGP en R2.

3.3	On R2 in the “ISP Network”, conFigura MP-BGP.	ConFigura two default static routes via interface Loopback 0: • An IPv4 default static route. • An IPv6 default static route. ConFigura R2 in BGP ASN **500** and use the router-id 2.2.2.2. ConFigura and enable an IPv4 and IPv6 neighbor relationship with R1 in ASN 300. In IPv4 address family, advertise: • The Loopback 0 IPv4 network (/32). • The default route (0.0.0.0/0). In IPv6 address family, advertise: • The Loopback 0 IPv4 network (/128). • The default route (::/0).	4

Fuente: CISCO - Autor.

R2

```
ip route 0.0.0.0 0.0.0.0 loopback 0
ipv6 route ::/0 loopback 0
router bgp 500
bgp router-id 2.2.2.2
neighbor 209.165.200.225 remote-as 300
neighbor 2001:db8:200::1 remote-as 300
address-family ipv4
neighbor 209.165.200.225 activate
no neighbor 2001:db8:200::1 activate
network 2.2.2.2 mask 255.255.255.255
network 0.0.0.0
exit-address-family
address-family ipv6
no neighbor 209.165.200.225 activate
neighbor 2001:db8:200::1 activate
network 2001:db8:2222::/128
network ::/0
exit-address-family
```

3.4 configuración de MP-BGP en R1.

Tabla 14. Configuración MP-BGP - en R1.

3.4	On R1 in the “ISP Network”, conFigura MP-BGP.	ConFigura two static summary routes to interface Null 0: • A summary IPv4 route for 10.XY.0.0/8. • A summary IPv6 route for 2001:db8:100::/48. ConFigura R1 in BGP ASN **300** and use the router-id 1.1.1.1. ConFigura an IPv4 and IPv6 neighbor relationship with R2 in ASN 500. In IPv4 address family: • Disable the IPv6 neighbor relationship. • Enable the IPv4 neighbor relationship. • Advertise the 10.XY.0.0/8 network. In IPv6 address family: • Disable the IPv4 neighbor relationship. • Enable the IPv6 neighbor relationship. • Advertise the 2001:db8:100::/48 network.	4

Fuente: CISCO - Autor.

R1

```
ip route 10.0.0.0 255.0.0.0 null0
ipv6 route 2001:db8:100::/48 null0
router bgp 300
bgp router-id 1.1.1.1
neighbor 209.165.200.226 remote-as 500
neighbor 2001:db8:200::2 remote-as 500
address-family ipv4 unicast
neighbor 209.165.200.226 activate
no neighbor 2001:db8:200::2 activate
network 10.0.0.0 mask 255.0.0.0
exit-address-family


address-family ipv6 unicast
no neighbor 209.165.200.226 activate
neighbor 2001:db8:200::2 activate
network 2001:db8:100::/48
exit-address-family
```

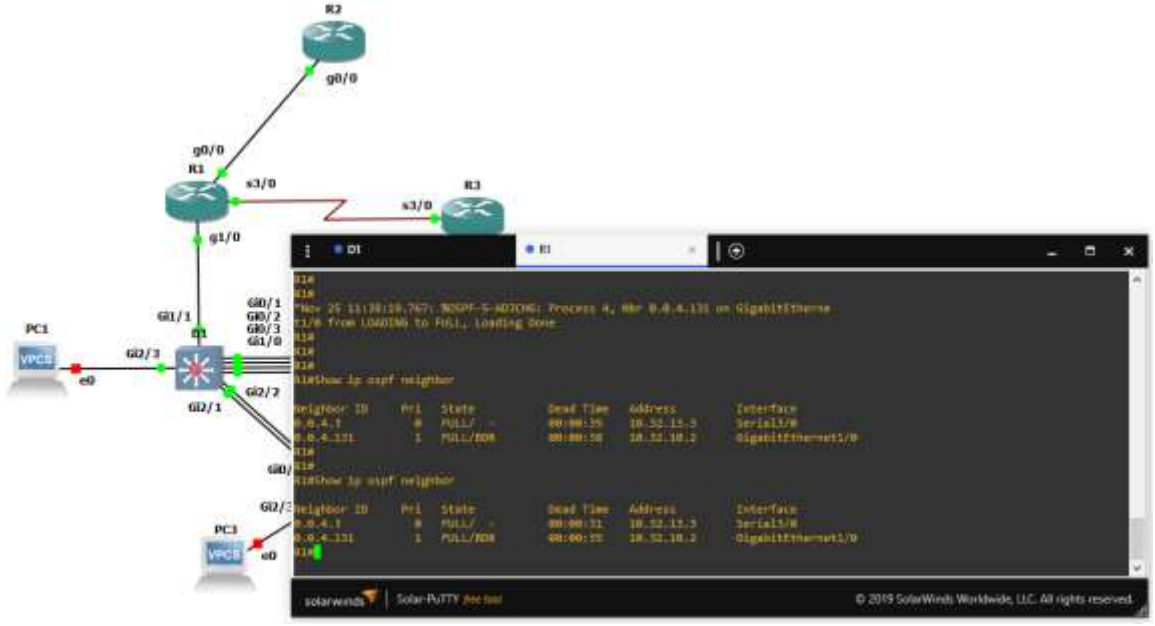
R1:

Int g1/0
negotiation auto
no duplex - según corresponda.

3.5 VERIFICAMOS OSPF.

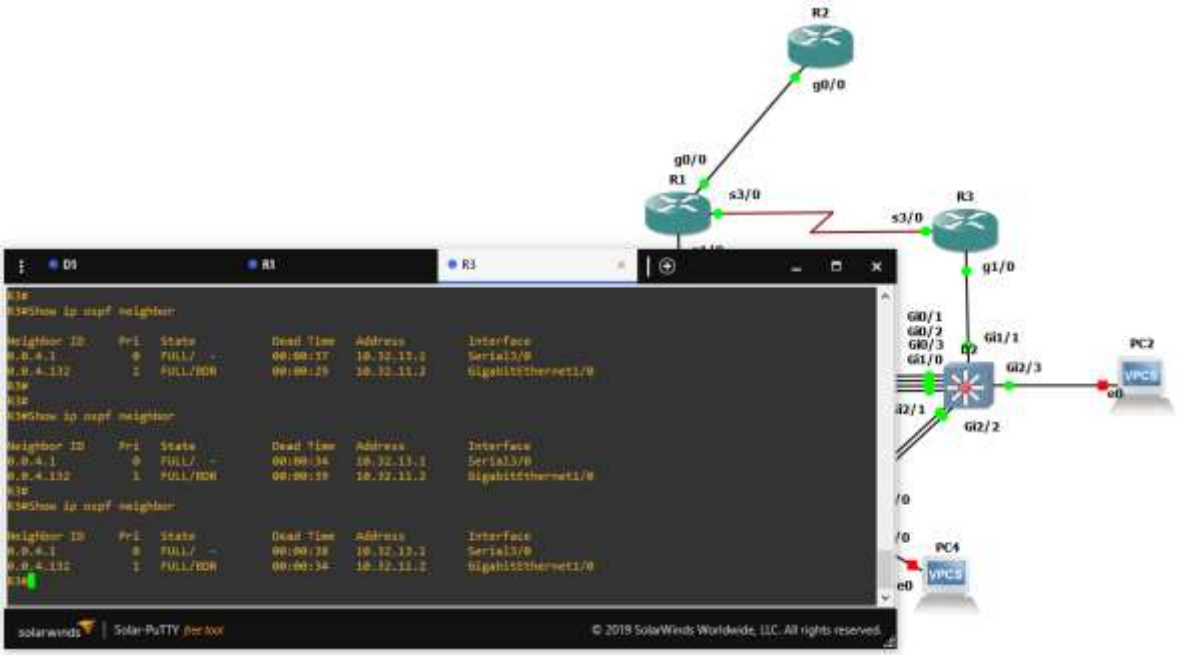
Show ip ospf neighbor

Figura 20. Show IP OSPF neighbor R1



Fuente: Autoría Propia.

Figura 21. Show IP OSPF neighbor R3



Fuente: Autoría Propia.

4. CONFIGURA FIRST HOP REDUNDANCY

In this part, you will conFigura HSRP version 2 to provide first-hop redundancy for hosts in the “Company Network”.

Your configuration tasks are as follows:

4.1 creación de IP SLAs en D1

Tabla 15. Creación de IP SLACs en D1.

Task#	Task	Specification	Points
4.1	On D1, create IP SLAs that test the reachability of R1 interface E1/2.	Create two IP SLAs. • Use SLA number **4** for IPv4. • Use SLA number **6** for IPv6. The IP SLAs will test availability of R1 E1/2 interface every 5 seconds.	2

Task#	Task	Specification	Points
		Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6. • Use track number **4** for IP SLA 4. • Use track number **6** for IP SLA 6. The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.	

Fuente: CISCO - Autor.

D1

```
ip sla 4
frequency 5
exit
ip sla 6
icmp-echo 2001:db8:100:1010::1
frequency 5
exit
ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now
track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
```

4.2 creación de IP SLAs en D2

Tabla 16. Creación de IP SLACs en D2.

4.2	On D2, create IP SLAs that test the reachability of R3 interface E1/0.	Create two IP SLAs. • Use SLA number **4** for IPv4. • Use SLA number **6** for IPv6. The IP SLAs will test availability of R3 E1/0 interface every 5 seconds.	2

		Schedule the SLA for immediate implementation with no end time. Create an IP SLA object for IP SLA 4 and one for IP SLA 6. • Use track number **4** for IP SLA 4. • Use track number **6** for IP SLA 6. The tracked objects should notify D1 if the IP SLA state changes from down to up after 10 seconds, or from up to down after 15 seconds.	

Fuente: CISCO - Autor.

D2

```
ip sla 4
icmp-echo 10.32.11.1
frequency 5
exit

ip sla 6
icmp-echo 2001:db8:100:1011::1
frequency 5
exit

ip sla schedule 4 life forever start-time now
ip sla schedule 6 life forever start-time now

track 4 ip sla 4
delay down 10 up 15
exit
track 6 ip sla 6
delay down 10 up 15
exit
```

4.3 Configurar HSRPv2 en D1

Tabla 17. Configuración de HSRPv2 en D1.

4.3	On D1, conFigura HSRPv2.	D1 is the primary router for VLANs **100** and **102**; therefore, their priority will also be changed to 150. ConFigura HSRP version 2.	8

		ConFigura IPv4 HSRP group **104** for VLAN 100: • Assign the virtual IP address **10.XY.100.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 and decrement by 60. ConFigura IPv4 HSRP group **114** for VLAN 101: • Assign the virtual IP address **10.XY.101.254**. • Enable preemption. • Track object 4 to decrement by 60. ConFigura IPv4 HSRP group **124** for VLAN 102: • Assign the virtual IP address **10.XY.102.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 to decrement by 60. ConFigura IPv6 HSRP group **106** for VLAN 100: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**. • Enable preemption. • Track object 6 and decrement by 60. ConFigura IPv6 HSRP group **116** for VLAN 101: • Assign the virtual IP address using **ipv6 autoconfig**. • Enable preemption. • Track object 6 and decrement by 60. ConFigura IPv6 HSRP group **126** for VLAN 102: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**. • Enable preemption. • Track object 6 and decrement by 60.	

Fuente: CISCO - Autor.

D1

interface vlan 100
standby version 2
standby 104 ip 10.32.100.254
standby 104 priority 150
standby 104 preempt
standby 104 track 4 decrement 60

```
interface vlan 101
standby version 2
standby 114 ip 10.32.101.254
standby 114 preempt
standby 114 track 4 decrement 60

interface vlan 102
standby version 2
standby 124 ip 10.32.102.254
standby 124 priority 150
standby 124 preempt
standby 124 track 4 decrement 60

interface vlan 100
standby 106 ipv6 autoconfig
standby 106 priority 150
standby 106 preempt
standby 186 track 6 decrement 60
exit

interface vlan 101
standby 116 ipv6 autoconfig
standby 116 preempt
standby 116 track 6 decrement 60
exit

interface vlan 102
standby 126 ipv6 autoconfig
standby 126 priority 150
standby 126 preempt
standby 126 track 6 decrement 60
exit
```

4.4 Configurar HSRPv2 en D2

Tabla 18. Configuración de HSRPv2 en D2.

	On D2, conFigura HSRPv2.	D2 is the primary router for VLAN **101**; therefore, the priority will also be changed to 150. ConFigura HSRP version 2.	

		ConFigura IPv4 HSRP group **104** for VLAN 100: • Assign the virtual IP address **10.XY.100.254**. • Enable preemption. • Track object 4 and decrement by 60. ConFigura IPv4 HSRP group **114** for VLAN 101: • Assign the virtual IP address **10.XY.101.254**. • Set the group priority to **150**. • Enable preemption. • Track object 4 to decrement by 60. ConFigura IPv4 HSRP group **124** for VLAN 102: • Assign the virtual IP address **10.XY.102.254**. • Enable preemption. • Track object 4 to decrement by 60. ConFigura IPv6 HSRP group **106** for VLAN 100: • Assign the virtual IP address using **ipv6 autoconfig**. • Enable preemption. • Track object 6 and decrement by 60. ConFigura IPv6 HSRP group **116** for VLAN 101: • Assign the virtual IP address using **ipv6 autoconfig**. • Set the group priority to **150**. • Enable preemption. • Track object 6 and decrement by 60. ConFigura IPv6 HSRP group **126** for VLAN 102: • Assign the virtual IP address using **ipv6 autoconfig**. • Enable preemption. • Track object 6 and decrement by 60.	

Fuente: CISCO - Autor.

D1

interface vlan 100
standby version 2
standby 104 ip 10.32.100.254
standby 104 preempt
standby 104 track 4 decrement 60

interface vlan 101
standby version 2
standby 114 ip 10.32.101.254
standby 114 priority 150

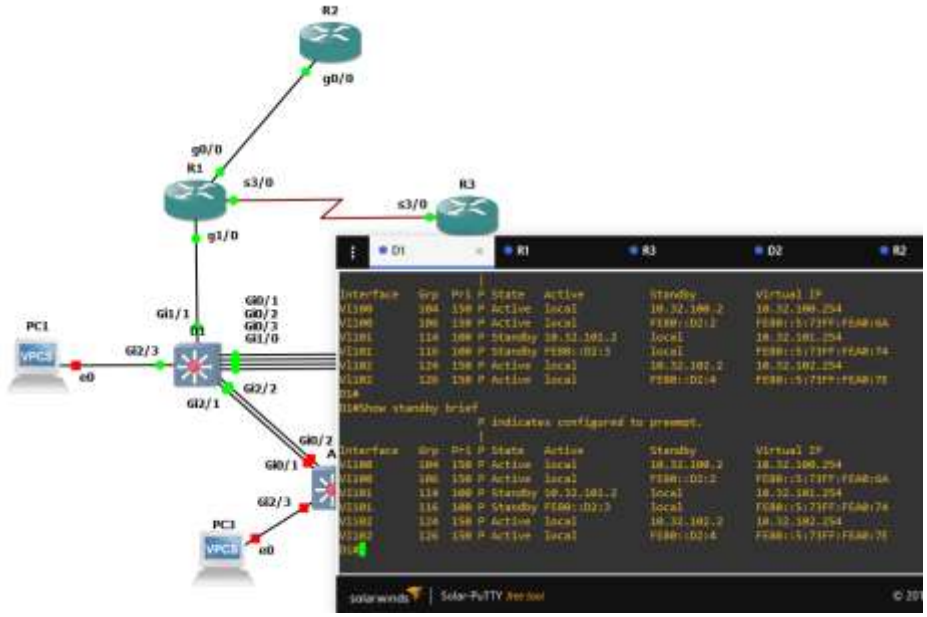
```
standby 114 preempt
standby 114 track 4 decrement 60

interface vlan 102
standby version 2
standby 124 ip 10.32.102.254
standby 124 preempt
standby 124 track 4 decrement 60

interface vlan 100
standby 106 ipv6 autoconfig
standby 106 preempt
standby 106 track 6 decrement 60
exit

interface vlan 101
standby 116 ipv6 autoconfig
standby 116 priority 150
standby 116 preempt
standby 116 track 6 decrement 60
exit

interface vlan 102
standby 126 ipv6 autoconfig
standby 126 preempt
standby 126 track 6 decrement 60
exit
```

1.5 VERIFICIÓN DE CONFIGURACIÓN.

VERIFICACIÓN.

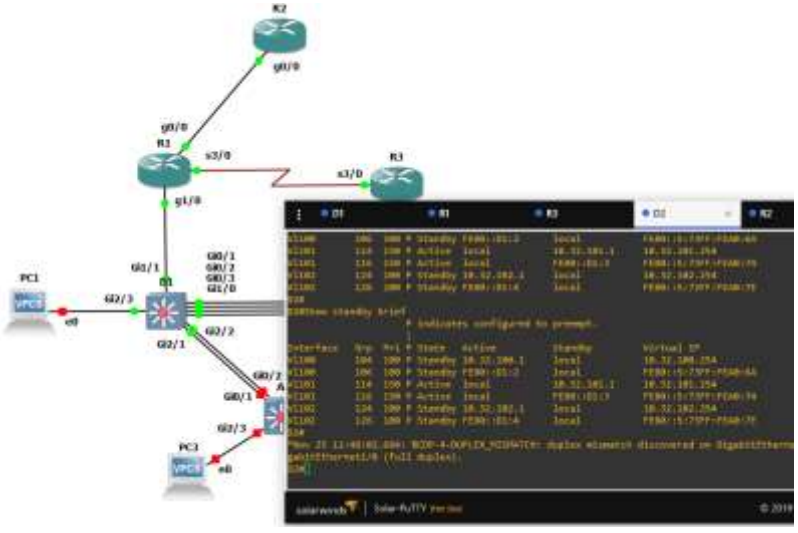
- Show standby brief

Figura 22. Show standby brief D1.



Fuente: Autoría Propia.

Figura 23. Show standby brief D2.



Fuente: Autoría Propia.

CONCLUSIONES

El presente Diplomado ha sido la base fundamental para poder cumplir con el desarrollo de la presente actividad, el material con el que se cuenta es muy completo y nos brinda todo el soporte necesario para una buena vida profesional.

El vital desde la etapa de diseño de la red contar con toda la información necesaria con el fin de cumplir con cada una de las expectativas de la organización, tanto en aspectos de seguridad de los dispositivos en sí, como de los más importante que es la información de la organización.

Se sebe configurar y limitar el acceso a nuestra red con el fin de evitar la vulnerabilidad de los diferentes aspectos de la misma.

Se debe cifrar la comunicación, con el fin de evitar que personas mal intencionadas puedan acceder a la misma.

GNS3 es una herramienta muy poderosa gracias a la cual nos fue posible realizar el montaje y verificación del correcto funcionamiento de nuestra red.
CISCO es la organización más importante de nuestros días en la fabricación de dispositivos de Telecomunicación.

Hemos desarrollarlo una red corporativa empleando tecnología CISCO, gracias a lo cual nos permitió profundizar mucho más en este mundo de las telecomunicaciones.

La red es totalmente funcional y cumple con cada uno de los aspectos solicitados.

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ANEXOS.

Anexo A - Enlace de descarga de simulación de escenario:

https://1drv.ms/u/s!ApNuqqD6HvXfapvxCiAmmgeLMyA?e=XIkHtj